Screen vs. Spray Coating of LPI Solder Mask

Depending on the finished product it can also lead to increased Cu thicknesses on the surface, as well. All of this can create great challenges when trying to produce finer solder mask webs & apertures, while trying to clear vias (from application through developing).

We're increasingly being asked "What are the best methods for coating LPI solder mask". This is not an easy question to answer. It really comes down to the type of PWBs you manufacture and the type of obstacles you encounter. There is no "Best" solution for solder mask coating applications. Both screen and spray have their own unique advantages and disadvantages. Some board designs are well suited for spray while others are better suited for screen printing. Increased Cu heights pose challenges with each process. Much of the interest in spray coaters comes from the fact that they generally reduce the amount of mask in the through holes. Clearing solder mask out of the vias becomes less of a challenge which can, allow you to decrease the dwell time in the developer and make finer solder mask webs and features easier to produce. Spray coaters will also introduce new challenges such as the need to handle greater amounts of solvents and the potential need for special exhaust systems & permits, depending on the location of the PWB fabricator.

The chart below lists many of the positives and negatives of each coating method.

Spray (HVLP) Pros	**Screen Coat (Double-sided Screen Coater) Pros**
Minimizes mask coated in through holes	Less solder mask waste
Faster change between panel sizes	Simple mask mixing/less need for solvent dilute
Easier change between solder mask types and colors	Less risk of solder mask sagging
Potential for shorter developer dwell times which can allow smaller webs to be held with less exposure energy	Better 1 coat coverage
Less opportunity for skips on high Cu work	Lesser exhaust requirements
Less chance of micro bubbles from thick coatings	Can plug/tent small holes
No screens to make, clean and maintain	Less odors
Less equipment coating variables than Double-sided screen coaters	
Can coat single sided panels	

Spray (HVLP) Cons	**Screen Coat (DOUBE-SIDED SCREEN COATER Coater) Cons**
Average of 25-35% more solder mask waste	Different panel sizes require a set up change
Requires more exhaust due to over spray	Switching mask types or colors require more down time and potentially more screens and ink troughs
More involved solder mask mixing / viscosity control	Greater risk of micro-bubbles and skips with high Cu
Potential for less coverage at knee of traces due to Cu height / shape of circuit edge	Need to clean / maintain screens, squeegees, flood bars and troughs
Greater risk of sagging solder mask	Can't be used in single sided application
Can't plug/tent holes with solder mask because this would require a separate screening application	Condition of screens and squeegees must be monitored and replaced on a regular basis
Potential for more solvent odors depending on exhaust	Generally coats more solder mask into the holes which can cause issues at developing
Environmental concerns due to fumes being exhausted so may require exterior fume scrubber depending on by-laws for a specific area	
Higher degree of cleaning maintenance dependent on the spray equipment purchased	
Constant handling of solvents	

As you can see from the chart above, there are positives and negatives for each process. Neither process is best suited for all applications. It ultimately comes down to which application meets your needs. Sprayers in N. America account for about 15-20% of the solder mask coating applications – most still screen print. The number of companies adding spray coaters to their capabilities is growing every year. Some fabricators add a spray coater to supplement, and not to replace their current screen printing capabilities. This allows the fabricator better flexibility.